Conclusions: The ERG test triggered epicardial coronary spasm in more than 40% of Japanese patients who underwent diagnostic angiography for assessment of stable angina and unobstructed coronary arteries. Our results suggest that abnormal coronary vasomotion plays pathogenic role in this setting and that the ERG test might be useful to identify patients with cardiac symptoms, despite normal coronaries.

TCT-432

Angiographic Characteristics according to Acetylcholine Dose Responsible for Significant Coronary Artery Spasm

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Background: We assume that patients (pt) showing positive acetylcholine (Ach) provocation test to lower Ach dose may more vulnerable to CAS. We investigated whether there are differences in angiographic characteristics according to Ach dose causing significant CAS during intracoronary Ach provocation test.
Methods: A total 1730 consecutive pts underwent Ach provocation test by incremental doses of 20, 50, 100 were enrolled. Significant CAS was defined as focal or diffuse severe transient luminal narrowing (>70%) with/without chest pain or ST-T change on ECG. Angiographic characteristics were compared between the Low dose group (20 & 50 ug, n=716) and High dose group (100 ug, n=1014) among pts with positive Ach provocation test.
Results: Baseline clinical characteristics were similar between the two groups except the Low dose group had more elderly (> 50 years), diabetes mellitus and previous myocardial infarction (MI). During the Ach provocation test, the incidence of atrio-ventricular (AV) block, severe CAS (>70% stenosis by QCA), multi-vessel spasm and diffuse spasm were more frequent in low dose group (Table).
Conclusions: In our study, we found that pts showing significant CAS to lower Ach dose showed more chance to have severe, diffuse and mulitvessel spasm during the test. Special care with intensive medical therapy should be considered who showed significant Ach response to lower Ach dose as compared with those responded to higher Ach dose.

Table. Angiographic characteristics of Positive response to Lower Ach dose versus High Ach dose

Variables, n (%)	Low dose (20 & 50 ug) (n=716 pts)	High dose (100 ug) (n=1014 pts)	P-value
AV block	153(21)	170 (16)	0.016
Severe spasm (>70%)	427(60)	447(44)	<0.001
Single vessel spasm	412(58)	696(69)	<0.001
Multiple vessel spasm	304(43)	318(31)	<0.001
Diffuse spasm (>30mm)	602 (84)	819(81)	0.077
Focal spasm (<10mm)	114 (16)	195 (19)	0.077

TCT-433

Impact of Beta-Blocker on Angiographic and Clinical Parameters during Intracoronary Acetylcholine Provocation Test

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Background: Beta blockers (BB) are widely used to control hypertension. It is well known that BB may lead to significant vasospasm. However, the impact of chronic administration of BB on clinical and angiographic characteristics during acetylcholine (Ach) provocation test is not clarified yet.
Methods: A total 3034 consecutive patients (pts) underwent coronary angiography with Ach provocation test from January 2004 to August 2010 were enrolled for this study. Ach was injected in incremental doses of 20, 50, 100μg into the left coronary artery. Significant coronary artery spasm (CAS) was defined as focal or diffuse severe transient luminal narrowing (>70%) with/without chest pain or ST-T change on ECG. A total 1394 pts (45.9%) showed positive provocation tests. Among the (+) provocation test pts, we compared the clinical and angiographic characteristics of patients with beta-blocker to those without beta-blocker in pts with myocardial infarction.
Results: The baseline clinical and procedural characteristics are well balanced between the two groups. There was no difference in the incidence of myocardial bridges, chest pain, ischemic ECG changes and atrioventricular (AV) block on ECG, incidence of baseline spasm, severe vasospasm, multi-vessel involvements during the Ach provocation test were similar in both groups
Conclusions: The use of beta blocker in pts with vasospastic angina was not associated with worse clinical and angiographic parameters during the Ach provocation test. BB may be safely used in pts with vasospastic angina.

Table. Clinical and Angiographic Parameters during Ach provocation test

Variables, n (%)	BB* (n=74)	Control (n=1320)	P-value
Myocardial bridge	17 (22.9)	350 (26.5)	0.501
QCA Analysis			
QCA, <50%	6 (8.1)	77 (5.8)	0.421
QCA, 50-70%	27 (36.4)	566 (42.8)	0.279
QCA, >70%	41 (55.4)	677 (51.2)	0.490
Diffuse long spasm (> 30mm)	64 (86.4)	1076 (81.5)	0.281
Chest pain	46 (56.7)	821 (62.1)	0.348
EKG change	4 (5.4)	85 (6.4)	0.723
AV block	14 (18.9)	237 (17.9)	0.834

*BB: patients with Beta-blockers.

TCT-434

Implantation of Sirolimus-Eluting Stent in Patients with Vasospastic Angina Deteriorates Late Catch-Up Phenomenon

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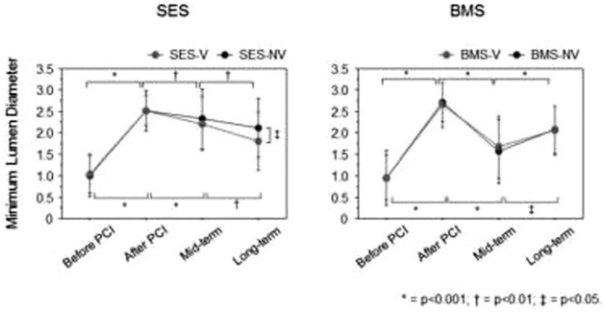
Background: The recent study has shown that an implantation of sirolimus-eluting stent (SES) is associated with late restenosis, i.e., late catch-up phenomenon. We investigated long-term angiographic outcome in patients with vasospastic angina (VSA) treated with the SES.
Methods: Subjects were patients who had undergone an ergonovine-provocation test for chest pain, and were subsequently treated with an SES or bare-metal stent (BMS) because of a progression of coronary artery stenosis. Patients were divided into four groups: SES with vasospasm (SES-V, n=26); SES without vasospasm (SES-NV, n=53); BMS with vasospasm (BMS-V, n=28); and BMS without vasospasm (BMS-NV, n=46). Coronary angiography was performed at 8 months (mid-term follow-up) and 20 months (long-term follow-up) after the implantation of the stent.
Results: As shown in the figure, the SES implantation was associated with a reduction of minimum lumen diameter (MLD) at the long-term follow-up, indicating late catch-up phenomenon. This phenomenon was more obvious in patients with VSA than in those without (p<0.05). Both BMS groups showed a reduction in MLD at the mid-term follow-up compared with immediately after the intervention. This reduction had regressed at the long-term follow-up, and that was unrelated to VSA. The rate of stent edge restenosis compared with stent body restenosis in the SES-V group (87.3%) was higher than that in the SES-NV group (25.0%, p<0.05), suggesting the association of vasospasm with stent restenosis.



Conclusions: The SES implantation may be associated with high rate of late restenosis in patients with vasospastic angina.

TCT-435

Spontaneous Coronary Dissection: 10 Years Follow Up in Our Cath Lab

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Background: Spontaneous coronary artery dissection (SCAD) is a rare cause of ischemic disease.It occurs frequently in young population with predilection for women-.Real incidence is probably underestimated.
Methods: we analyzed angiographic aspects and risk factors of consecutive Pts underwent coronary angiography and discharged by our Division with diagnosis of SCAD from January 1999 to June 2008.
Results: We observed an angiographic aspect of SCAD in 33/10073 pts(0.33%): 21 women(64%).Mean age 50.8 yy.The cause of admission:STEMI in 9 Pts (27.7%),NSTEMI in 16(48.3%),subacute myocardial infarction in 2(6%), angina or positive stress test in 6(18%). One vessel disease in 31 Pts.SCAD of anterior descending

artery in 12 cases(1 left main),circumflex artery in 10, right artery in 11. TIMI flow at the diagnosis was:3 or 2 in 13 Pts and 0/1 in 20 Pts. According to the National Heart, Lung and Blood Institute (NHLBI) classification:1 Pt showed type A coronary dissection,17 type B, 5 type C, 3 type D, 5 type E and 7 type F.In 2 Pts SCAD occurred in the post partum period, in 1 Pt during estro-progestinic hormonal therapy.2 Pts were affected by antiphospholipid syndrome,1 Pts had hyperfibrinogenemia,1 mutation of prothrombin gene,1 Hashimoto tiroiditis. 26 Pts(78%) were treated with conservative medical therapy (10 Pts only with ASA 100 mg die, 8 with double antiplatelet therapy ASA + Clopidogrel, 3 Pts with warfarin and 5 Pts with ASA + Warfarin).In 5 Pts (15%) we performed an emergency PCI + stent and in 2 Pts an emergency coronary artery by-pass graft operation. 1 Pt dead for cardiogenic shock after the coronary angiography. In 15 pts (42.4%) we performed the angiographic follow up at 6 months:7 Pts no evidence of SCAD,4 Pts persistence of dissection,2 Pts with one vessel disease at the first coronarography showed two vessels disease at the control exam.In the 2 Pts with by-pass we observed the complete resolution of dissection in the native vessels with occlusion of the grafts.

Conclusions: The SCAD is more frequent in women (65%).The prognosis is good in the population treated with medical therapy.Mortality is low (1 Pt).The percentage of spontaneous resolution of coronary dissection is elevated (59%).

TCT-436

Association of Myocardial Bridge and Acetylcholine Dose Response in Patients with Vasospastic Angina

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Background: It is well known that myocardial bridge (MB) is a risk factor of vasospastic angina. But, clinical significance and angiographic characteristics of patients (pts) with both (+) acetylcholine (Ach) provocation test results and MB according to Ach dose are not clarified yet.

Methods: A total 3034 consecutive pts underwent coronary angiography with intracoronary Ach provocation tests were enrolled for this study. Ach was injected by incremental doses of 20, 50, 100μg into the left coronary artery. Significant coronary artery spasm (CAS) was defined as focal or diffuse severe transient luminal narrowing (>70%) with/without chest pain or ST-T change on ECG. A total 483 pts (15.9%) had both MB with vasospasm. We compared the clinical and angiographic characteristics, and clinical outcomes of (+) provocation pts with MB according to Ach dose (20, 50, 100μg).

Results: The baseline clinical and procedural characteristics are well balanced among the three groups. There was no difference in the incidence of chest pain, ischemic EKG change and AV block in 3 groups. But, the pts with Low Ach dose group (20μg) was associated with higher incidence of baseline spasm, severe vasospasm, more diffuse spasms (>30mm) than those with the High dose group (50,100μg). The incidence of 12-month mortality and recurrent chest pain were higher in the Low Ach dose group (20μg, Table).

Conclusions: The pts with MB significantly responded to low Ach dose were also associated with more diffuse, severe and basal spasm than pts respond to high dose consistent with those without myocardial bridge and 12-month mortality and recurrent chest pain were higher incidence in Low Ach dose group (20μg), suggesting more intensive medical therapy with close clinical follow up will be required for these patients.

Table. Angiographic and clinical parameters according to Ach dose

Variables, n (%)	Ach 20ug (n=23)	Ach 50ug (n=147)	Ach 100ug (n=313)	P-value
Myocardial bridge				
Baseline spasm (narrowing>30%)	14 (60.8)	44 (29.9)	79 (25.2)	0.003
Ach induced spasm (narrowing>70%)	23 (100)	130 (88.4)	214 (68.3)	<0.001
QCA Analysis				
QCA, <50%	0 (0)	5 (3.4)	14 (4.4)	0.295
QCA, 50-70%	10 (43.4)	40 (27.2)	89 (28.4)	0.439
QCA, >70%	13 (56.5)	85 (57.8)	111 (35.4)	<0.001
Diffuse spasm (> 30mm)	14 (60.8)	97 (65.9)	161 (51.4)	0.010
EKG change	1 (4.3)	9 (6.1)	11 (3.5)	0.315
AV block	5 (21.7)	32 (21.7)	51 (16.2)	0.164
Chest pain_	11 (47.8)	86 (58.5)	156 (49.8)	0.278
12Month Clinical Outcomes				
Mortality	1 (4.3)	0 (0)	0 (0)	0.013
Recurrent Chest Pain	2 (8.6)	4 (3.2)	3 (1.4)	0.043

TCT-437

The Impact of Gender difference on Angiographic Characteristics During intracoronary acetylcholine provocation test in Korean patients

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Background: The gender difference is known to be a predictor of coronary artery spasm (CAS). However, angiographic characteristics during ACh provocation test according to the gender difference was rarely reported.

Methods: A total 2504 consecutive patients without significant coronary artery disease who underwent the acetylcholine(ACh) provocation test were enrolled between November 2004 and October 2010. The patients were divided into two groups according to gender (male : n=1158, female : n=1346).

Results: At baseline, the incidence of current smoking and the level of body mass index, triglyceride, and uric acid were higher in male patients. But, the level of low density lipoprotein and high density lipoprotein were higher in female patients. At angiographic characteristics, the incidence of myocardial bridge, ACh induced CAS, multivessel and diffuse spasm, chest pain during the ACh provocation test were higher in male patients. Multivariate analysis showed that male gender was a predictor of ACh induced CAS (odds ratio : 1.245, 95% confidence interval: 1.004-1.543, p<0.001), and old age, current smoking, myocardial bridge and baseline spasm were also a predictor of ACh induced CAS.

Conclusions: In this study, male patients was more associated with conventional cardiovascular risk factors and also a independent predictor of ACh induced CAS, and multiple and diffuse spasm. Therefore, gender difference must be considered in antianginal treatment and male patients with CAS would require more intensive treatment and close clinical follow up.

1. Baseline Characteristics between gender groups

	Male (n=1158)	Female (n=1346)	P value
Baseline characteristics			
Age	51.17±12.61	56.14±11.97	<0.0001
Body mass index	24.56±3.114	23.96±3.433	<0.0001
Left Ventricular ejection fraction(%)	58.72±4.631	58.83±4.621	0.7068
Hypertension	478(41.2)	574(42.6)	0.4596
Dyslipidemia	169(14.5)	208(15.4)	0.5490
Current smoking	492(42.4)	44(3.2)	<0.0001
Laboratory finding			
Total cholesterol	179.9±36.67	183.4±36.37	0.0005
Triglyceride	150.2±109.1	118.2±77.97	<0.0001
LDL-C	114.6±33.46	118.5±33.31	0.0140
HDL-C	48.37±12.25	54.78±13.60	<0.0001
Uric acid	5.577±1.376	4.187±1.054	<0.0001

2. Angiographic Characteristics during ACh provocation test

	Male (n=1158)	Female (n=1346)	P value
Myocardial bridge	297(25.6)	206(15.3)	<0.0001
Baseline spasm (narrowing>30%)	294(25.3)	371(27.5)	0.2193
Ach induce spasm (narrowing>70%)	709(61.2)	700(52)	<0.0001
Multivessel spasm	253(21.8)	217(16.1)	0.0003
Diffuse long lesion (>30mm)	576(49.7)	571(42.4)	0.0002
Acetylcholine dose			
Ach 20ug	43(3.7)	38(2.8)	0.2094
Ach 50ug	247(21.3)	225(16.7)	0.0032
Ach 100ug	419(36.1)	437(32.4)	0.0506
EKG change	46(3.9)	42(3.1)	0.2483
Chest pain	667(49.3)	659(48.9)	<0.0001

3. Multivariate analysis of ACh induced CAS

Variable,n(%)	P-value	Odds ratio	95%C.I
Age	<0.001	1.023	1.014-1.030
Gender (Male)	0.046	1.245	1.004-1.543
Body mass index	0.170	1.020	0.991-1.048
Hypertension	0.040	0.814	0.668-0.990
Diabetes	0.260	1.182	0.883-1.582
Dyslipidemia	0.922	1.013	0.778-1.319
Current smoking	0.004	1.413	1.118-1.784
Myocardial bridge	<0.001	3.217	2.508-4.125
Baseline spasm (narrowing>30%)	<0.001	1.592	1.292-1.962

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